Energy-efficient, flexible and reliable drive solutions for the future

Up to 70% reduction in number of variants with VLT® FlexConcept®

www.danfossdrives.com
Modern manufacturing systems need higher efficiency, more flexibility and greater reliability in their drive systems than ever before — all necessary to reduce manufacturing costs.

To meet that need, Danfoss has developed the VLT® FlexConcept® — a contemporary drive system using modern motor technology, combined with the most advanced variable frequency drives, and developed as a unified system.

**Highest efficiency**
The most efficient AC drives in the world, coupled with highly reliable geared motor units driven by compact, efficient permanent magnet (PM) motors is the ideal drive solution for every high-volume manufacturing facility.

**Drives — your choice**
Danfoss VLT® drives offer a flexible choice of drives for a centralized location in control rooms or decentral units for mounting close to or even onto the drive motors, giving you greater flexibility in plant design and maintenance.

**Meets the toughest hygiene regulations**
To meet the specialized wash-down needs of hygiene-specific conditions such as in food and beverage plants, the VLT® OneGearDrive® geared motor unit has a smooth crevice-free design that leaves no hiding places for germs or food contamination. At the same time, the durable coating applied to both the prime movers and the VLT® Decentral Drive FCD 302 has been designed to withstand the harshest cleaning chemicals and processes, ensuring effective wash-down with no detriment to reliability.

**Reduced spare parts stocks**
The variety of drive solutions available to the manufacturing industry is greater than ever before, which can result in substantial stocks of spare parts and increasing costs for storing and maintaining those spares. VLT® FlexConcept® cuts through this problem and can reduce the number of drive variants by up to 70%.

**Drive solutions**
for dry, wet, aseptic and hygiene-critical areas
With fewer variants, VLT® FlexConcept® simplifies project planning, installation, commissioning, and maintenance, especially in conveyor applications, whether a centralized or decentralized plant design is required.

The system components provide the user with maximum flexibility with a minimum number of units — i.e., motors, gear units and AC drives, which offer a unified operating design and standard functions.

**Variant reduction up to 70%**

VLT® FlexConcept® offers the highest level of flexibility in selecting drive components and system structures, regardless of whether the system is to be centralized or decentralized or whether the drives are for use in dry, wet or aseptic areas. The overall number of system variants could be reduced by up to 70%.

**Maximum energy efficiency — lowest running costs**

Maximizing energy efficiency has been a prime focus in the development of VLT® FlexConcept®.

All the components guarantee a high level of efficiency and either meet or beat the new EU regulations relating to motors and their use in systems, as well as in the retrofitting or modernization of existing systems.

**Open system architecture**

The open system architecture of the VLT® FlexConcept® allows users to meet the demands of a new system development or a retrofit by combining with available solutions from other control vendors to implement the best configuration possible.

This eliminates any dependence on a single supplier while maximizing system efficiency and control flexibility.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Customer benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation of AC and PM motors</td>
<td>Manufacturer independence; suitable for simple or dynamic applications</td>
</tr>
<tr>
<td>Centralized or decentralized</td>
<td>Flexible system planning; simple integration of existing system parts</td>
</tr>
<tr>
<td>Open-loop operation</td>
<td>Simple cabling; cost reduction</td>
</tr>
<tr>
<td>Closed-loop operation</td>
<td>Synchronization of dynamic band sections and machines</td>
</tr>
<tr>
<td>Equal parameter structure and operation</td>
<td>Reduced training expenditure; same display and PC software for parameterization; text in national language for rapid diagnosis</td>
</tr>
<tr>
<td>Safety function</td>
<td>No costly protective combinations required; high level of operating safety and system availability</td>
</tr>
<tr>
<td>Enclosure type up to IP69K</td>
<td>Use in all system areas. Flexibility also in retrofits</td>
</tr>
<tr>
<td>High level of efficiency at up to 90% (VLT® OneGearDrive* together with VLT® AutomationDrive FC 302)</td>
<td>Reduction of TCO costs (cost savings of up to 25% compared to conventional systems)</td>
</tr>
<tr>
<td>Worldwide support</td>
<td>Worldwide Danfoss service</td>
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</table>
Effective, ongoing cost reduction requires drive solutions that significantly reduce running costs and the adoption of the latest high-efficiency technology by both the operator and the system manufacturer.

They should also aim to optimize installation, commissioning, maintenance and service costs by optimizing staff resources and maximizing system availability.

The VLT® FlexConcept® provides the user with perfectly adapted components for energy-efficient drives in all system areas. It consists of the VLT® OneGearDrive®, the VLT® Decentral Drive FCD 302 and the VLT® AutomationDrive FC 302.

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**4 points of cost optimization**

**High efficiency**
All the drives used in the VLT® FlexConcept® stand out for their high level of efficiency and energy savings. The high-efficiency PM motors meet or beat the current and projected efficiency categories, in smaller frame sizes, than current induction motors. Efficiency is maximized in the system as a whole by the matched design of the motors and the inverters.

This in turn affords a smaller spare parts inventory, particularly for larger systems, along with reduced storage costs and faster component availability compared to current standard drive solutions.

**Lower training and maintenance costs**
Training expenditure and maintenance staff requirements are greatly reduced by the unified operating design and standard operating scope of VLT® drives, in addition to the simple connection of the VLT® OneGearDrive® Hygienic drive motors via stainless steel pin connectors.

**Flexibility**
Easily and reliably combine components with existing solutions from other manufacturers on both centralized and decentralized systems.

The open system architecture of the VLT® FlexConcept® means that standard, geared and PM motors can all be controlled and operated at high efficiency by Danfoss VLT® drives.
Centralized or decentralized — always the right solution

The choice of a centralized or decentralized drives solution is not always that clear cut. Both solutions offer advantages depending on the system structure.

The choice of solution depends upon a variety of factors, such as spatial and environmental conditions, the scope of the system and the acceptability to the end user. Economic aspects also figure into the equation, such as cabinet or control room costs compared to cabling expenditure.

Application-dependent design
Ultimately, the application dictates the system design. It is essential to engage with the drives supplier to make an accurate, detailed system cost analysis. Since service staff and technicians will have to gain familiarity with the technology adopted, acceptability by the end user is critical.

Both solutions include the option of shifting the system intelligence to the individual drives. Such a shift increases efficiency depending on the drive functionality required.

The solution for both designs
VLT® FlexConcept® perfectly meets the needs of both centralized and decentralized systems, ensuring the use of components perfectly adapted to the system structure.

VLT® drives are compact and available with enclosure ratings from IP00 to IP69K. All VLT® FlexConcept® drives benefit from unified operation and are matched to common filters and coils and provide the same interfaces and use the same parameterization software.

The geared motor units are available with finishes from standard to anti-bacterial varnish. For direct use in hygiene-critical production areas, all the components are resistant to aggressive detergents in the range pH 2.14 to guarantee optimal hygiene with long-term reliability.

For retrofit applications, all VLT® FlexConcept® components are compatible with existing industry-standard system components, including PM motors.

A cost-effective integrated solution
VLT® FlexConcept® provides system manufacturers and end users with a fully integrated drive solution. Costs are reduced at the planning stage, as documentation, training, and spare parts and storage requirements are all reduced, thanks to the new motor body design and the unified drive operating structure.
IPA certification — for hygiene-critical areas

Hygiene requirements are extremely strict in areas where machines come into direct contact with products in food and beverage production equipment, and in areas in which an increased risk of contamination exists for exposed food and beverages.

**Meets current hygiene legislation**
Legislation demands that all component construction design must be adapted as effectively as possible to the manufacturing process and the product flow in the food sector.

The materials used must not influence the food in any way (e.g., by the migration of material components) and must all be easy to clean (hygienic design).

**IPA-certified**
The VLT® OneGearDrive® is IPA-certified by the Frauenhoffer Institute for use directly in clean rooms. All VLT® FlexConcept® components are matched to each other to ensure rapid commissioning and the optimum efficiency of the overall solution.

**Smooth surfaces resistant to cleaning materials**
Absolute cleanliness demands components with extremely smooth surfaces and no hiding place for germs or contamination. This permits the free flow of liquids and the easy removal of residual products and the prevention of contaminant build-up.

All VLT® FlexConcept components for installation directly on the production floor are finished with perfectly smooth surfaces and the motors and gears made with a seamless, crevice-free fit. These components are resistant to all standard detergents and disinfectants of pH 2.14.

The VLT® OneGearDrive® is designed without fans, and the gears are filled with special oil suitable for the food sector.

They can be supplied with stainless steel shafts up to V4A and AISI 316 as an option, and the shaft end is fitted with a cover.
Access all areas — robust, reliable and clean

Wet and hygiene-critical areas
VLT® FlexConcept® offers distinct advantages in wet production areas. The VLT® Decentral Drive FCD 302 enclosure, along with the matched, geared motor enclosure, fulfills the requirements of DIN 1672-2 Hygienic Design and all enclosures are designed to IP66/67 and IP69k. The system components offer no hiding place for contaminants or harmful micro-organisms such as bacteria, yeast or fungus.

The smooth, fan-free design of both motors and drives prevents the circulation or distribution of dirt particles and germs and eliminates the possibility of aerosol formation and the subsequent contamination of products under manufacture, making them ideally suited for use in wet production areas.

A positive benefit of mounting the VLT® Decentral Drive FCD 302 close to or on the motor is the cable reduction. This not only saves space but eliminates electromagnetic interference with other system components.

A typical combination might be a VLT® OneGearDrive® with a VLT® Decentral Drive FCD 302.

In a centralized system, a VLT® AutomationDrive FC 302 with the same unified control strategy would be used with the VLT® OneGearDrive®, as it can support up to 300 m of unshielded cables or 150 m of shielded cables.

Dry areas
For conveyors in dry areas, a standard VLT® FlexConcept® solution would be the efficient, compact VLT® OneGearDrive® Standard. In a centralized system, a VLT® AutomationDrive FC 302 mounted centrally. This drive solution could be equipped with a motor-mounted brake and a transmitter, for greater precision, particularly on conveyor belts with inclines or declines.

VLT® Decentral Drive FCD 302 is completely flexible and, of course, can be mounted in centralized system structures, on the wall close to the motor, on the conveyor or even on the motor itself. The matrix below gives an overview of the recommended combinations of motors and drives for different production areas.

<table>
<thead>
<tr>
<th>Area</th>
<th>VLT® OneGearDrive® Standard</th>
<th>VLT® OneGearDrive® Hygienic</th>
<th>VLT® Decentral Drive FCD 302 Standard</th>
<th>VLT® Decentral Drive FCD 302 Hygienic</th>
<th>VLT® AutomationDrive FC 302 IP00/IP20</th>
<th>VLT® AutomationDrive FC 302 IP55/IP66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry area</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Wet area</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Hygiene-critical area</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>

1) Mounted on panel outside hygiene-critical area

The FCD 302 connection box with integrated T-distributors allows for rapid installation and commissioning.

The VLT® OneGearDrive® Standard with a terminal box (an optional brake is available).

The VLT® AutomationDrive FC 302 is available for centralized installation.

For simple parameterization, LCP 102 (the graphical control unit of the FC series) can be connected.
Proven experience

Today’s food and beverage production lines need higher efficiency, more flexibility and greater reliability in order to achieve effective and ongoing cost reductions.

The VLT® FlexConcept® conveyor solution combines integrated modern motor technology with the latest motor control components to create a coordinated, standardized system that optimizes energy consumption and minimizes maintenance costs.

The open system architecture allows users to meet the demands of a new system development or a retrofit by combining with solutions provided by other vendors to implement the best configuration possible. This eliminates any dependence on a single supplier.

The VLT® FlexConcept® consists of:
- VLT® OneGearDrive®
- VLT® DecentralDrive FCD 302 and/or
- VLT® AutomationDrive FC 302

Follow us to learn more about AC drives

Nestlé Vera Naturae, Castrocielo, Italy

Reduce spare-part inventory by up to 70%

Up to 63% energy savings on the conveyor lines

Efes Pilsen, Ankara, Istanbul, Izmir, Adan, Turkey

>30% increase in conveyor efficiency

Peroni Brewery, Italy

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